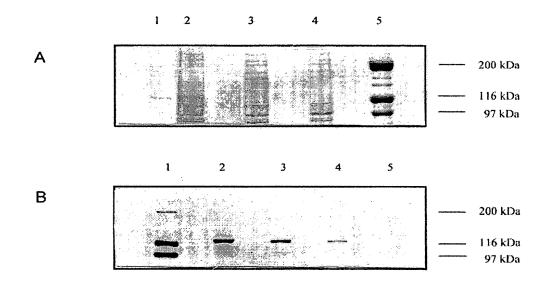


mutant type II Legend: — - protein Sequence: 1 MIASHMIACL FTELNONOVO KVDQFLYHMR LSDETLLEIS RRFRKEMEKG LGATTHPTAA 61 VKMLPTFVRS TPDGTEHGEF LALDLGGTNF RVLRVRVTDN CLQRVEMENQ IYAILEDIMR 121 GSGTQLFDHI AECLANFMDK LQIKEKKLPL GFTFSFPCHQ TKLDESFLVS WTKGFKSSGV 181 ECRDVVDLIR KVIQRRGDFD IDIVAVVNDT VGTMMTCGYD DQNCEIGLIV GTGSNACYME 241 EMRHIDMVEG DEGRMCINME WGAFGDDGTL NDIRTEFDRE IDMGSLNPGK QLFEKMISGM 301 YMGELVRLIL VKMAKAELLF QGKLSPELLT TGSFETKDVS DIEEDKDGIE KAYQILMRLG 361 LNPLQEDCVA THRICQIVST RSASLCAATL AAVLWRIKEN KCEERLRSTI GVDGSVYKKH 421 PHFAKRLHKA VRRLVPDCDV RFLRSEDGSC KGAAMVTAVA YRLADQHRAR QKTLESLKLS 481 HEQLLEVKRR MKVEMEQGLS KETHAVAPVK MLPTYVCATP DGTEKGDFLA LDLGGTNFRV 541 LLVRVRNGKR RGVEMHNKIY SIPQEVMHGT CEELFDHIVQ CIADFLEYMG MKGVSLPLGF 601 TFSFPCQQNS LDQSILLKWT KGFKASGCEG EDVVTLLKEA IHRREEFDLD VVAVVNDTVÇ 661 TMMTCGYEDP HCEVGLIVGT GSNACYMEEM RNVELVDGEE GRMCVNMENG AFGDNGCLDD 721 LRTVFDVAVD ELSLNPGKOR FEKMISCMYL GEIVRNILID FTKRGLLFRG RISERLKTRG

781 ISETKFLSQI ESDCLALLQV RAILRHLGLE STCDDSIIVK EVCTVVARRA AQLCGAGMAR 841 VVDKIRENRG LDNPKVTVGV DGTLYKLHPH FAKVMHETVR DLAPKCDVSF LESEDGSGKG

901 AALITAVACR IREAGQR



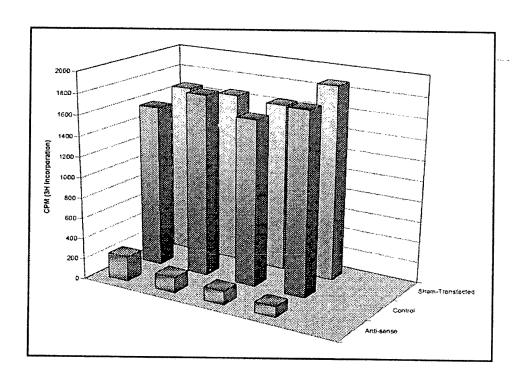


FIGURE 5

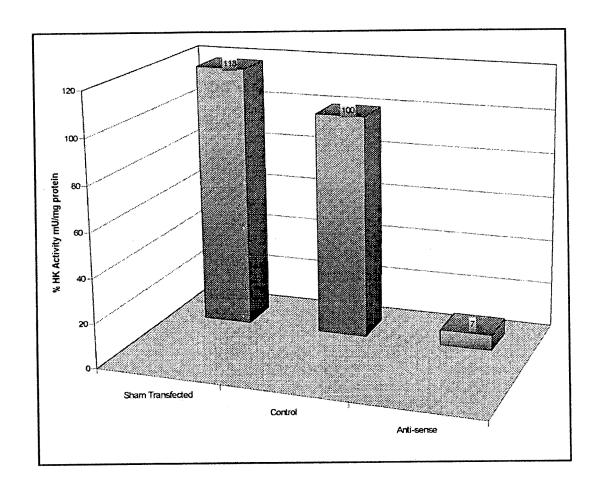


FIGURE 6

AF027179 Rattus norvegicus mutant type II hexokinase mRNA, complete cds

```
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  aaggttgacc aattteteta ecacatgegt eteteagatg agaecettet ggagatttet 121
  aggeggttee ggaaggagat ggagaaaggg etaggageta ceaegeaeee tacageaget 181
  gtgaaaatgt tgcctacctt tgtgaggtca actccggatg ggacagaaca tggggagttc 241
  ctggctctgg atcttggagg aaccaacttc cgtgtgctcc gagtaagggt gacggacaat 301
  ggcctccaga gagtggagat ggagaaccag atctacgcca teettgagga catcatgcgg 361
 ggcagtggaa cccagctgtt tgaccacatc gccgaatgcc tggccaactt catggacaag 421
 ctacaaatca aagagaagaa gctccctctg ggtttcacct tctcgttccc ctgccaccag 481
 acaaaactgg atgagagttt tttggtctcg tggactaagg ggttcaagtc cagtggcgtg 541
 gaaggcagag atgtggtgga cctgatccgg aaggttatcc agcgcagagg ggactttgac 601
 attgacattg tggccgtggt gaatgacaca gttgggacca tgatgacttg tggctatgat 661
 gatcagaact gcgagattgg tctcattgtg ggcactggca gcaacgcctg ctacatggag 721
 gaaatgcgtc atattgacat ggtggaggga gatgagggc gcatgtgcat caacatggag 781
 tggggagcct ttggggacga cggtacactc aatgacatcc gaaccgagtt tgaccgagag 841
 ategacatgg getegetgaa eeetgggaag cagetgtttg agaagatgat tagegggatg 901
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aagggattca aggcatctgg ctgcgagggt gaggatgtgg tcaccttgct gaaggaagcg 1921
attcaccggc gagaggagtt tgacctggat gtggttgccg tggtgaatga cacagttggg 1981
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gaggtgtgca ctgtggttgc ccggcgcgct gcacagctct gtggcgcagg catggccgcc 2521
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gacgggactc tgtataagct tcatcctcac tttgccaagg tcatgcatga gacggtgaga 2641
gatctggctc cgaaatgtga cgtgtccttc ctggaatccg aggacggcag tgggaaggga 2701
gcagetetca teaetgeegt ggeetgeege ateegggagg etgggeagag atag
```

FIGURE 7A

AF113968 Cloning vector pLXRN, complete sequence

```
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ccctattccc cacactcacc ggagccaaag ccgcggccct tccgtttctt tgcttttgaa 181
agaccccacc cgtaggtggc aagctagctt aagtaacgcc actttgcaag gcatggaaaa 241
atacataact gagaatagaa aagttcagat caaggtcagg aacaaagaaa cagctgaata 301
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gccaagaaca gatggtcccc agatgcggtc cagccctcag cagtttctag tgaatcatca 481
gatgtttcca gggtgcccca aggacctgaa aatgaccctg taccttattt gaactaacca 541
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```

FIGURE 7B

| cttttctgga | ttcatcgact | gtggccggct | gggtgtggcg | gaccgctatc | aggacatagc | 3301 |
|------------|--------------|------------|----------------|------------|------------|------|
| gttggctacc | cataatatta | ctgaagagct | tggcggcgaa | tgggctgacc | gcttcctcgt | 3361 |
| gctttacggt | atcgccgctc | ccgattcgca | gcgcatcgcc | ttctatcgcc | ttcttgacga | 3421 |
| gttcttctga | acaggactet | ggggttcgat | aaaataaaag | attttattta | gtctccagaa | 3481 |
| aaaaaaaaaa | atgaaagacc | ccacctgtag | gtttggcaag | ctagcttaag | taacgccatt | 3541 |
| ttacaaggca | tagaaaaata | cataactgag | aataqaqaaq | ttcagatcaa | ggtcaggaac | 3601 |
| agatggaaca | actgaatatg | ggccaaacag | gatatctgtg | gtaagcagtt | cctgccccgg | 3661 |
| ctcagggcca | agaacagatg | gaacagctga | atatqqqcca | aacaggatat | ctgtggtaag | 3721 |
| cagttcctgc | cccaactcaa | ggccaagaac | agatggtccc | cagatgcggt | ccagccctca | 3781 |
| gcagtttcta | gagaaccatc | agatgtttcc | agggtgcccc | aaggacctga | aatgaccctg | 3841 |
| tgccttattt | gaactaacca | atcagttcgc | ttctcqcttc | tgttcgcgcg | cttctgctcc | 3901 |
| ccgageteaa | taaaagagcc | cacaacccct | cactcqqqqc | gccagtcctc | cgattgactg | 3961 |
| agtcgcccgg | gtacccgtgt | atccaataaa | ccctcttqca | gttgcatccg | acttgtggtc | 4021 |
| tractattcc | ttaggagggt | ctcctctgag | tgattgacta | cccqtcagcg | ggggtctttc | 4081 |
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| gaggtaaggt | aactacctca | cacatttcaa | tgatgacggt | gaaaacctct | gacacatgca | 4201 |
| acteceaaaa | acggtcacag | cttqtctqta | agcggatgcc | gggagcagac | aagcccgtca | 4261 |
| gaacacatca | acaaatatta | acaaatatca | ggggggagcc | atgacccagt | cacgtagcga | 4321 |
| tagcagagta | tatactggct | taactatgcg | gcatcagage | agattgtact | gagagtgcac | 4381 |
| catatgcggt | gtgaaatacc | gcacagatgc | gtaaggagaa | aataccgcat | caggcgctct | 4441 |
| tecaetteet | cactcactga | ctcactacac | tcaatcattc | gactacaaca | agcggtatca | 4501 |
| geteacteaa | aggcggtaat | acqqttatcc | acagaatcag | qqqataacgc | aggaaagaac | 4561 |
| atgtgaggaa | aaggccagca | aaaggccagg | aaccqtaaaa | aggccgcgtt | gctggcgttt | 4621 |
| ttccataggc | t.ccgccccc | tgacgagcat | cacaaaaatc | gacgctcaag | tcagaggtgg | 4681 |
| cgaaacccga | caggactata | aagataccag | gcqtttcccc | ctggaagctc | cctcgtgcgc | 4741 |
| teteetatte | cgaccctgcc | gcttaccgga | tacctgtccg | cctttctccc | ttcgggaagc | 4801 |
| ataacacttt | ctcatagctc | acqctqtaqq | tatctcagtt | cggtgtaggt | cgttcgctcc | 4861 |
| aagctgggct | gtgtgcacga | accccccqtt | cagcccgacc | gctgcgcctt | atccggtaac | 4921 |
| tatcatctta | agtccaaccc | ggtaagacac | qacttatcgc | cactggcagc | agccactggt | 4981 |
| aacaggatta | gcagagcgag | gtatgtaggc | ggtgctacag | agttcttgaa | gtggtggcct | 5041 |
| aactacggct | acactagaag | gacagtattt | ggtatctgcg | ctctgctgaa | gccagttacc | 5101 |
| ttcggaaaaa | gagttggtag | ctcttgatcc | ggcaaacaaa | ccaccgctgg | tagcggtggt | 5161 |
| ttttttattt | gcaagcagca | gattacgcgc | agaaaaaaag | gatctcaaga | agatcctttg | 5221 |
| atcttttcta | cagaatctaa | cactcagtag | aacgaaaact | cacgttaagg | gattttggtc | 5281 |
| atgagattat | caaaaaqqat | cttcacctag | atccttttaa | attaaaaatg | aagttttaaa | 5341 |
| tcaatctaaa | gtatatatga | gtaaacttgg | tctgacagtt | accaatgctt | aatcagtgag | 5401 |
| gcacctatct | cagcgatctg | tctatttcgt | tcatccatag | ttgcctgact | ccccgtcgtg | 5461 |
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| gctagagtaa | gtagttcgcc | agttaatagt | ttgcgcaacg | ttgttgccat | tgctgcaggc | 5701 |
| atcataatat | cacqctcqtc | gtttggtatg | gcttcattca | gctccggttc | ccaacgatca | 5761 |
| aggcgagtta | catgatecee | catgttgtgc | aaaaaagcgg | ttagctcctt | cggtcctccg | 5821 |
| atcgttgtca | gaagtaagtt | ggccgcagtq | ttatcactca | tggttatggc | agcactgcat | 5881 |
| aattctctta | ctqtcatqcc | atccgtaaga | tgcttttctg | tgactggtga | gtactcaacc | 5941 |
| aagtcattct | gagaatagtg | tatgcggcga | ccgagttgct | cttgcccggc | gtcaacacgg | 6001 |
| gataataccq | cqccacataq | cagaacttta | aaagtgctca | tcattggaaa | acgttcttcg | |
| J | | _ | - - | | | |

FIGURE 7C

| C 0 C 1 | | | | | | |
|---------|------------|------------|------------|------------|------------|------------|
| 909T | gggcgaaaac | tctcaaggat | cttaccgctg | ttgagatcca | gttcgatgta | acccactcqt |
| 6121 | gcacccaact | gatcttcagc | atcttttact | ttcaccagcg | tttctgggtg | aqcaaaaaca |
| 6181 | ggaaggcaaa | atgccgcaaa | aaagggaata | agggcgacac | ggaaatgttg | aatactcata |
| 6241 | ctcttccttt | ttcaatatta | ttgaagcatt | tatcagggtt | attgtctcat | gagcggatac |
| 6301 | atatttgaat | gtatttagaa | aaataaacaa | ataggggttc | cgcgcacatt | tccccqaaaa |
| 6361 | gtgccacctg | acgtctaaga | aaccattatt | atcatgacat | taacctataa | aaataggcgt |
| | | cctttcatct | | | | 33 3 |

FIGURE 8A

Accession Number NM_012734 for Rattus norvegicus Hexokinase 1 (Hk1), mRNA

```
egeegatetg eegetggagg accaetgete accagggeta etgaggagee actggeecea 61
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cttcaccgag ctgaaggatg accaagtcaa aaagattgac aagtatctgt acgccatgcg 181
gctctctgat gagattctga tagatatcct gacacgattc aagaaagaga tgaagaatgg 241
cctctcccgg gattataatc caacagcctc cgtcaagatg ctgcccacct tcgtccggtc 301
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gatctacgac accccagaga acatcgtgca tggcagtgga acccagcttt tcgatcatgt 481
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gaggggaaag ttcaacacta gtgacgtgtc cgccattgaa aaggataagg aaggcattca 1141
aaatgccaag gaaatcttaa cccgcttggg agtggagccg tctgatgttg actgtgtgtc 1201
ggtccagcac atctgcacga tcgtctcctt ccgatcagcc aacctggtgg ccgccacgct 1261
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ccatgatgta gcctccttac tgagggatgc ggtgaagagg agagaggaat ttgacttgga 2041
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cacttgcgaa attggactca tcgtggggac gggcaccaat gcctgctaca tggaggagat 2161
gaagaatgtg gagatggtgg aggggaacca gggccagatg tgcatcaaca tggagtgggg 2221
cgccttcggt gacaatgggt gtctggatga catcagaaca gactttgaca aagtggtgga 2281
cgaatattct ctaaactctg ggaaacaaag gtttgagaaa atgatcagtg ggatgtacct 2341
gggtgagatc gtccgtaaca tcctgattga cttcaccaag aaaggcttcc tcttccgggg 2401
acagatetee gaaccaetea agaccegagg catetttgag accaagttte teteteagat 2461
tgagagtgac cggttagcgc tgctccaggt gcgggccatc cttcagcagc tgggtttgaa 2521
cagcacgtgt gacgacagta tcctggtcaa gaccgtgtgt ggggtggtgt ccaagagggc 2581
ggctcagctg tgtggtgccg gcatggccgc cgtggtggaa aagatcagag agaacagagg 2641
cctagaccat ctgaatgtaa ctgtgggagt ggatgggacg ctctacaaac ttcatccaca 2701
cttctccaga atcatgcacc aaactgtgaa ggaactgtca ccaaagtgta ccgtgtcctt 2761
cctcctgtct gaagacggca gcggcaaggg ggccgccctt atcacagctg tgggcgtgcg 2821
gctcagagga gaccettega tegeetaaaa gecaggatee teecageeee cageeegeca 2881
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ctgggagacc cagccagcgc ccactccgcc gcagcagagg gaggaagggg accgcagtaa 3001
cggagcacca cgtagaatac cacccagagc gcgtgtgctg ttgatctgat ctctcgcctg 3061
gacccctaat ccctgccctg ccactctgca tgattcaagt tcgacctggc catgcattgc 3121
```

FIGURE 8B

| | | agggggtgc | gtctactgca | gatgtccagc | taggaaagag | 3181 |
|------------|------------|-----------------------|---|-------------|--------------------------|------|
| ccatgagtga | acgtagegge | accccggcgc | 500000000000000000000000000000000000000 | tecatagaat | taggaaagag | 3241 |
| tcccctctct | tggacagtct | tetgggeeet | tecaageeea | cccgcggaga | cggcctctcc | 3301 |
| | tata | atatattatc | accaucauau | actigooggae | 0000 | |
| | | a a a t a t a a a a | arducactuc | Laccades | • | |
| aggggcgtgg | Colgaaggeg | gagegeggae | tagatatata | gatgccacag | aattgtgaat attttgtttt | 3421 |
| ccagcacccg | ccgcagcctg | ccatcccgic | tggatgtate | tattag | atttattt | 3481 |
| | | CARTCELAGE | CACALLALLY | acaqcocogo | | |
| | | a a a a t a a t a a a | nnnicacia | 2446444 | | |
| gteteetggt | 990999999 | 5~55~55 | anacaacacc | atcactggaa | tttccatcgc ttc | 3601 |
| gaacatcttg | ctagaaggaa | ccaacccacg | aaacaacac | tttatactaa | ttc | |
| cccaattctt | tagtgagcca | ttqttgtacg | tctagtaaac | tttgtactga | | |